REMARKS

AMENDMENTS TO THE CLAIMS

The claims have been amended to remove any recitations to the Bunsen Coefficient, and the new claims added likewise do not recite the Bunsen Coefficient. Instead, the claims as amended recite an amount of inert gas, air or nitrogen, sufficient to cause a stated volume increase as the developing foam instantaneously leaves the mix head.[1] Furthermore, temperature and/or pressure values at which the reactants are provided to the mix head have been recited. New claim 42 has been added, and is supported in applicant's original disclosure at page 11, lines 15-23.

New claim 43 has been added, and is supported in Applicants original disclosure at page 11, lines 7-9.

New claim 44 has been added, and is supported in Applicants original disclosure at page 11, lines 17-19, as disclosed in the co-pending international application PCT/US02/06823 which is incorporated by reference.

New claim 45 has been added, and is supported in Applicants original disclosure at page 11, lines 27-28.

New claim 46 has been added, and is supported in Applicants original disclosure at page 4, lines 24-30.

New claim 47 has been added, and is supported in Applicants original disclosure at page 11, lines 15-23.

New claim 48 has been added, and is supported in Applicants original disclosure at page 11, lines 17-19.

New claim 49 has been added, and is supported in Applicants original disclosure at page 11, lines 17-19, as disclosed in the co-pending international application PCT/US02/06823 which is incorporated by reference.

New claim 50 has been added, and is supported in Applicants original disclosure at page 11, lines 27-28.

New claim 51 has been added, and is supported in Applicants original disclosure at page 4, lines 24-30.

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[1] Applicants note *In re Spiller*, 500 F.2d 1170, 182 USPQ 614 (C.C.P.A. 1974), where the court held that the term "sufficient", when defined in connection with functional criteria, is not indefinite under Section 112, second paragraph; in so doing, the court stated, "there is nothing indefinite in the use of claim language which defines particular amounts according to a functional criterion." *Id.*, 182 USPQ at 621-22.

New claim 52 has been added, and is supported in Applicants original disclosure at page 4, lines 8-9 and page 9, line 34 to page 10, line 5.

New claim 53 has been added, and is supported in Applicants original disclosure at page 6, lines 15-19.

New claim 54 has been added, and is supported in Applicants original disclosure at page 8, lines 7-9.

New claim 55 has been added, and is supported in Applicants original disclosure at page 11, lines 17-19, as disclosed in the co-pending international application PCT/US02/06823 which is incorporated by reference.

New independent claim 56 has been added and is supported by originally filed claim 1, and as otherwise indicated herein.

New claim 57 has been added, and is supported in Applicants original disclosure at page 11, lines 15-23.

New claims 58-59 have been added, and are supported in Applicants original disclosure at page 7, line 32 to page 8, line 1.

New claims 60-61 have been added, and are supported in Applicants original disclosure at page 4, lines 8-9 and at page 9, line 34 to page 10, line 5.

New claim 62 has been added, and is supported in Applicants original disclosure at page 6, lines 15-19.

New claim 63 has been added, and is supported in Applicants original disclosure at page 11, lines 27-28.

New independent claim 64 has been added and is supported by previously submitted claim 39, page 4, lines 5-13, and as otherwise indicated herein.

New claims 65-68 have been added and are supported in Applicants original disclosure at page 7, line 32 to page 8, line 1.

New claim 69 recites that the developing foam is frothey, as suggested by the written description such as at page 9.

CLAIM REJECTIONS UNDER 35 U.S.C. §112

Applicants believe the rejections under 35 U.S.C. § 112 are moot in view of the claim amendments and arguments made herein,

CLAIM REJECTIONS UNDER 35 U.S.C. § 102

Rejections over U.S. Patent No. 3,882,052 to Raynor et al.

The Examiner has rejected claims 1, 30-31, 34-36, 39 and 40 under 35 U.S.C. § 102(b) as being anticipated by Raynor et al. According to the Examiner, Raynor discloses preparations of isocyanate-based rigid foams prepared by contacting streams of isocyanate component and polyol component wherein the contacting takes place in the presence of blowing agent and nitrogen gas to enhance the foaming action.

The Examiner believes that Raynor anticipates the claims because the amounts of nitrogen provided in the compositions of Raynor and expelled under the pressure conditions of Raynor would inherently result in an expelled composition exhibiting the claimed expansion effects. Applicants disagree and initially note that the Examiner previously acknowledged that Raynor differs from the claimed invention with respect to formation of polyurethane foams.[2]

Furthermore, reconsideration is requested in view of the following. Applicants describe frothing as the instantaneous increase of volume of developing foam as it exits the mix head. (Pg. 9, ln. 24). This definition is consistent with the prior art – such as Raynor '052 – which describes frothing as a pre-expansion of a foaming mixture upon expulsion from a static mixer (col. 5, lines 55-60). The claims not only recite an instantaneous increase in the volume of developing foam as it leaves the mix head, but Claim 34 quantifies this increase by reciting an increase of at least 1.25.

Raynor '052 employs nitrogen as a "nucleating agent" in the production of polyurethane foams. The Examiner focuses on Raynor's teaching at Column 4, lines 15-33 which, without careful consideration, seems to suggest broad latitude in the amount of nucleating agent (e.g. nitrogen) that can be used:

> The nucleating gas may be used in any suitable proportion that is effective in bringing about thorough blending of the foam forming ingredients such as to produce an acceptable foam which is substantially uniform and free of weak spots. Thus this proportion can be varied over a wide range, limited only by practical considerations such as the capacity of the foam forming mixture to dissolve or hold the gas within it under the desired operational gas pressure and the nature of the particular foaming system that is used. Nevertheless, ordinarily a minimum of about 0.003% by weight of the gas, based on the total weight of the foam forming ingredients, is necessary to achieve the requisite nucleating effect. In actual practice a proportion of the gas in excess of 0.005 percent, such as from about 0.006 to about 0.08 percent by weight is used, although of course higher as well as lower concentration may suitably be employed.

[2] As shown by the Examiner's comments in the Office Action mailed May 5, 2006, on pages 5-6.

While this paragraph includes words like "any suitable proportion" and "of course higher as well as lower concentrations may suitable be employed," these words must be read in context and with an understanding of Raynor's intent and teachings as a whole. Namely, Raynor's primary concern is to avoid frothing! Indeed, Raynor discusses the problems associated with frothing at Column 1, lines 28-64:

> It is generally known that thorough mixing and blending of the foam forming ingredients, to the degree necessary for generating a uniform and acceptable foam which is free of weak spots, cannot ordinarily be achieved by the single expedient of using a static mixer. This is due in part to the relatively high viscosity of the foam forming reactants. Conventionally, therefore, resort is had to the added expedient of incorporating in the foam forming reaction mixture an auxiliary fluorocarbon blowing agent such as Freon 12. This material, when injected under pressure into the foam forming mixture, serves to augment the function of the static mixer in bringing about intimate and thorough blending of the foam forming ingredients.
>
> By virtue of the inclusion of this auxiliary blowing agent in the foam forming mixture, the blended components of the system, on being expelled from the foaming apparatus, characteristically have a limited-flow consistency similar to that of aerosol shaving cream. This is attributed to the fact that the auxiliary blowing agent causes partial pre-expansion or "frothing" of the mixture by the time this is expelled from the foaming apparatus. Thus the foam has come to be referred to in this particular art as a "frothed foam."
>
> The phenomenon of foam frothing, while it may be desirable in certain applications, **has at least two disadvantages**. One is that frothed foam is generally not well suited for the dispensation of repeated small foam shots such as used, for example, in making foam-insulated food and beverage containers. **Another disadvantage** is that because of its relatively high viscosity, the frothed mixture has limited flow characteristics. As such it cannot be satisfactorily used in molding intricate foam articles such as wood-simulated picture frames, table lamp bases, plaques and the like. **Thus a need exists in this art for a method which enables generating non-froth polyurethane foam by means of a portable foaming apparatus.** [emphasis added]

And, Raynor explains that practice of the disclosed invention avoids frothing at Column 5, lines 50-59:

> By utilizing a nucleating agent according to the invention, thorough blending of the foam forming ingredients is achieved, by means of a static mixer, to the degree necessary for producing a fully reacted polyurethane foam product which is substantially uniform and free of weak spots. **This result obtains in the substantial absence of any frothing.** That it is to say, the blended foaming mixture, upon expulsion from the static mixer, **exhibits no substantial pre-expansion and has a very fluid consistency**. [emphasis added]

Thus, there can be no question that Raynor '052 teaches the avoidance of frothing rather than achieving frothing. And, therefore, there is no possible way in which one could

conclude that Raynor '052 anticipates or renders obvious the invention as claimed, which requires frothing as defined by an instantaneous volume increase of at least 1.25.

Furthermore, Raynor does not contemplate a high-pressure mixing operation in which cell nucleation is achieved by the use of high pressures. One skilled in the art unquestionably understands that Raynor relates to on-site generation of non-froth polyurethane foam[3] using portable foaming devices equipped with static mixers[4]. As those skilled in the art understand, and as Raynor clearly suggests, nucleating agents are often used when low-pressure mixing is accomplished in a mix head. Consistent with a low-pressure, portable system employing a static mix head, Raynor only teaches pressures at 100 psig in the mix tanks, and increasing these pressures to only 240 psig[5]. Thus, Raynor unambiguously employs nitrogen to nucleate cell formation. In contradistinction, those skilled in the art understand that nucleating agents are not necessary in high-pressure mixing operations because the high-pressure under which the A-side and B-side ingredients are mixed causes cell nucleation.

Thus, when the teachings of Raynor are properly considered, and when the level of ordinary skill in the art is properly understood, there can be no question that a person having ordinary skill in the art would have no motivation to add inert gas as now claimed, especially in operations employing pressures of at least 1800 psi as set forth in claims 39, 42, 47, 57, and 64.

Furthermore, to the extent that Raynor teaches a low-pressure portable process, where non-froth foam is deposited into a mold[6], Applicants maintain that Raynor teaches against a process that employs a laminator (see e.g. claim 43), is continuous (see e.g. claim 44), or takes advantage of the "frothiness" of the foam in where it is deposited (see e.g. claim 45).

Rejections over U.S. Patent No. 5,264,464 to Wishneski et al.

The Examiner has also rejected claims 1, 30-31, 34-36, 39 and 40 under 35 U.S.C. § 102(b) as being anticipated by Wishneski et al. According to the Examiner, Wishneski discloses preparations of isocyanate-based rigid foams prepared by contacting streams of isocyanate component and polyol component wherein the contacting takes place in the presence of blowing agent in nitrogen gas to enhance the foaming action. The Examiner

[3] Column 1, lines 1-5
[4] Columns 5, lines 5-10
[5] Column 6, lines 58-65
[6] Column 5, lines 60-63

relies on column 7, lines 28-41 to maintain that Wishneski discloses the particular desirability to dissolve nitrogen in the contents of the mixture for the purposes of providing acceptable foams for their invention. Wishneski does not however disclose specific nitrogen concentrations and particularly does not teach providing nitrogen concentrations that would cause an instantaneous volume increase of at least 1.25. The Examiner asserts that it would have been obvious to one of ordinary skill in the art to have employed the varied contents of nitrogen gas of Wishneski for the purposes of providing an acceptable foam forming effect.

The very same arguments provided above are applicable to the rejection over Wishneski' 464, which teaches, at column 7, lines 28-41:

> In utilizing the concept of the invention for effecting the nucleation of the foam forming ingredients, it is critical that the nucleating gas, or at least a portion thereof, be blended, dissolved, or absorbed into the foam forming mixture. This critical requirement is to be distinguished from conventional prior art techniques wherein a gas, for example nitrogen, is used only as a propellant; and, as such, it is not blended with the foamable mixture and therefore exerts no substantial nucleating effect. This prior art technique, as noted above, necessitates the use of an auxiliary foaming agent to achieve adequate mixing **which in turn results in the generation of frothed foam, a result that this invention avoids.** [emphasis added]

There is no explanation as to how a reference that teaches the addition of nitrogen as a nucleating agent while seeking to avoid frothing can be employed to reject a claim (i.e. Claim 34) that requires frothing.

Those skilled in the art appreciate that the apparent difference between the teaching of Wishneski '464 (or Raynor '052) and the claimed invention is the amount of nitrogen added to the process. Wishneski employs an amount sufficient to act as a nucleating agent but that will not cause frothing. The claimed invention, on the other hand, employs an amount sufficient to cause frothing to an extent that a volume increase of 1.25 is achieved. Moreover, those skilled in the art appreciate that the simple of addition of nitrogen to a polyurethane foam forming mixture will NOT cause frothing. Indeed, Raynor '052 provides this teaching at column 5, lines 12-30:

> In utilizing the concept of the invention for effecting the nucleation of the foam forming ingredients, it is critical that the nucleating gas, or at least a portion thereof, be blended, dissolved, or adsorbed into the foam forming mixture. This critical requirement is to be distinguished from conventional prior art techniques wherein a gas, for example nitrogen, is used only as a propellant; and, as such, it is not blended with the foamable mixture and therefore exerts no substantial nucleating effect. This prior art technique, as noted above, necessitates the use of an auxiliary foaming agent to achieve adequate mixing which in turn results in the generation of frothed foam, a result that this invention avoids.

In other words, and as the Applicants have explained at Page 9-10 of the written description, nitrogen is absorbed by the polyurethane reactant streams. Only after a threshold amount is absorbed (which will require elevated pressures) will an instantaneous rise in volume occur (i.e. frothing). Raynor '052 and Wishneski '464, without question, employ an amount of nitrogen sufficient to achieve their stated goal, which is nucleation. These references, however, teach against the addition of amounts in excess thereof since the same would cause frothing. And, there is no teaching, suggestion, or motivation in these prior art references to do anything else.

Applicants further note that Wishneski, like Raynor, is directed toward making non-froth foams using a portable apparatus where the foam ingredients are contacted at low-pressure within a static mix head and deposited into a mold[7].

Thus, Applicants' arguments made above with respect to Raynor are equally applicable to Wishneski.

REJECTIONS UNDER 35 U.S.C. §103

The Examiner has rejected claims 32, 33, 37 and 38 under 35 U.S.C. § 103(a) as being unpatentable over Raynor et al. as applied to the claims as discussed above, and further in view of U.S. Patent No. 5,278,195 to Volkert. These same claims have also been rejected under 35 U.S.C. § 103(a) over Wishneski et al., as applied above, in view of Volkert. The arguments made above are equally applicable to the rejections under §103(a), and therefore Applicants do not believe that the combination of the references renders these, or any of the claims, obvious. Reconsideration is requested.

CONCLUSION

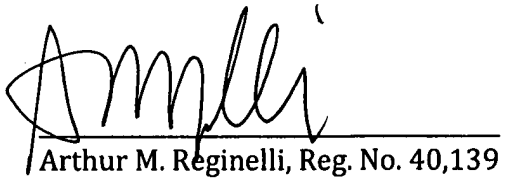
In view of the foregoing amendments and arguments presented herein, the Applicants believe that they have properly set forth the invention and accordingly, respectfully request the Examiner to reconsider the rejections provided in the last Office Action. A formal Notice of Allowance of claims 1, 30-40 and 42-69 is earnestly solicited. Should the Examiner care to discuss any of the foregoing in greater detail, the undersigned attorney would welcome a telephone call.

Applicants have added additional claims and believe that the enclosed PTO Form SB/17 accurately reflects an additional fee of $1,460.00, which the undersigned specifically authorizes the Commissioner to draw from Deposit Account No. 06-0925.

[7] See Column 1, lines 10-15, Column 6, lines 45-65, Column 9, line 30 and Column 9, line 38.

Additionally, in the event other fees are required for the filing of this document, the undersigned attorney hereby authorizes the Commissioner to charge payment of any fees associated with this communication or to credit any overpayment to Deposit Account No. 06-0925.

Respectfully submitted,



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